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REMARKS

With the above amendments, the specification has been amended to incorporate the parent and grandparent applications by reference. The abstract has been amended to comply with 37 C.F.R. § 1.72. The Figures 14-18 have been amended to include the designation "Prior Art."

Applicants' assert that the equations for Q and FF in the specification and claims are correct.

Claims 1-3 and 5-8 have been canceled without prejudice. Claim 4 has been amended and new claims 9-17 have been added. Specifically, claim 4 has been amended to incorporate the subject matter of claim 5; therefore, claim 4 as amended has the same scope as original claim 5.

New claim 9 depends upon claim 4 and recites that "the plurality of pressure flow control systems operate to correct transient mutual pressure changes in the plurality of flow passages, thereby maintaining steady fluid flow" as described on page 22, line 16, to page 23, line 8, and as shown in Figure 9 of the present application.

New independent claim 10 recites the subject matter similar to claim 4, but having a slightly different scope. Specifically, new claim 10 recites that "the plurality of parallel flow passages includes a first flow passage disposed in parallel with a second flow passage" as illustrated in Figure 7. Claims 11-13 depend either directly or indirectly upon claim 10 and recite subject matter supported on page 22, line 16, to page 23, line 8, and as shown in Figure 9 of the present application.

New independent claim 14 recites subject matter similar to claim 4, but having a slightly different scope. Specifically, new claim 10 is directed to the embodiment illustrated in Figure 7. Claims 15-17 depend either directly or indirectly upon claim 14 and recite

subject matter supported on page 22, line 16, to page 23, line 8, and as shown in Figure 9 of the present application.

The present amendment adds no new matter to the application.

The Invention

The present invention is broadly directed to a parallel divided flow fluid supply apparatus and flow factor-based fluid-switchable pressure flow control method, such as are used for supplying gases, or the like, for use in the production of semiconductors, chemicals, precision machine parts, etc. More specifically, in one embodiment in accordance with the present invention, a parallel divided flow fluid supply apparatus includes: (a) a pressure regulator having an upstream side and a downstream side; (b) a plurality of parallel flow passages disposed downstream of said pressure regulator, wherein a single flow of fluid from said pressure regulator is branched into said parallel flow passages; (c) a plurality of flow control valves disposed in said flow passages; and (d) a plurality of pressure flow control systems for controlling of the flow rate, one controller installed on each flow passage between two of said flow control valves disposed upstream and downstream of said controller respectively, wherein each pressure flow control system comprises: (i) an orifice formed downstream of said control system and upstream of the downstream flow control valve for discharging fluid from the flow passage; (ii) a control valve installed upstream of said orifice and downstream of the upstream flow control valve of said control system for controlling the flow rate of the fluid; (iii) a pressure detector disposed between said orifice and said control valve for detecting the pressure P_1 between said control valve and said orifice; (iv) a calculation control circuit, wherein with a pressure on an upstream side of said orifice set to be twice or more higher than a pressure on a downstream side of said orifice, the instantaneous flow rate Qc is calculated as $Qc = KP_1$, where K is a constant, from the

pressure P_1 on the upstream side of said orifice detected by said pressure detector, and a difference between an instantaneous flow rate Qc and a preset flow rate Qs is outputted as control signal Qy; and (v) a drive connecting said control valve and said calculation control circuit for receiving the control signal from the calculation control circuit and for sending the control signal to said control valve causing said control valve operating to bring the control signal Qy to zero.

Various other apparatus embodiments in accordance with the present invention are recited in the other independent and dependent claims. One main advantage of the present invention is that an apparatus for regulating the flow of various gases with high precision by using a pressure-type flow control system on the basis of calculated flow factors is provided, wherein the employment of the pressure-type flow control systems prevents transient changes in pressure and fluid flow rate in the parallel divided flow-type fluid supply. The prior art devices simply cannot achieve the unexpectedly superior steady state flow provided by the apparatuses in accordance with the present invention.

The Rejection

Claim 4 stood rejected in the parent case under 35 U.S.C. 103(a) as unpatentable over Applicants' admitted prior art (disclosed in Figure 15) in view of Nishino et al. (U.S. Patent 5,669,408).

Applicants respectfully traverse this rejection, set forth during prosecution of U.S. Patent Application No. 10/162,552, for the following reasons.

Applicants' Arguments

Figure 15 of the present application schematically illustrates a prior art two flow passage fluid supply apparatus (see page 17, lines 19-10, of the present application).

However, the apparatus shown in Figure 15 is plagued by undesirable transient signal surges as shown in Figure 16 when valves V_3 and V_4 are opened (i.e., switched from a closed to an open state). Applicants studied the apparatus shown in Figure 15 and determined that when the mass flow controller MFC_2 is opened quickly to reach the set flow rate level, a large quantity of material gas suddenly flows into flow passage S_2, which causes the pressure P_1A to drop transiently and cause the signal MFC_1 and MFM_1 to undergo a transient change as well (see instant specification, page 9, lines 3-7).

To solve this problem, Applicant's considered how to let material gas flow into passage S_2 gradually when opening valves V_3 and V_4 so as to minimize the transient surge effect. Applicants reasoned that a mass flow controller could not be used to adequately absorb these transient flow effects because the mass flow controllers measure the gas flow rate on the basis of the amount of heat either transferred, or carried away, by the fluid. Applicants concluded that when the change in gas flow rate exceeded the flow velocity for the fluid, then the flow rate control provided by a mass flow controller cannot follow the change in the flow very well, which results in the transient surges (see instant specification, page 10, lines 4-11).

Applicants eventually turned to pressure-type flow control systems, such as disclosed in Unexamined Japanese Patent Application No. 8-338546, for a solution to this surge problem because changes in pressure can be followed more quickly than changes in transferred heat energy (see instant specification, page 10, lines 12-15). The pressure-type flow control system taught in Unexamined Japanese Patent Application No. 8-338546 operates by measuring an upstream pressure P_1 and then calculating the flow rate Q_c based upon a linear equation (see instant specification, page 10, lines 16, to page 11, line 2). This allows an immediate determination of the flow rate Q_c by measuring upstream pressure P_1, which can also be measured more quickly than transferred heat.

The Examiner should note that U.S. Patent 5,669,408 to Nishino et al. claimed priority to Japanese Application No. 7-144722, which is the same application from which Unexamined Japanese Patent Application No. 8-338546 is derived. In other words, the Unexamined Japanese Patent Application No. 8-338546 to Nishino et al., the point of departure for the present invention, is from the same patent family, and is equivalent to, U.S. Patent 5,669,408 to Nishino et al., cited against the invention in the present case.

The 103 Rejection

Claim 4 stands rejected under 35 U.S.C. 103(a) as unpatentable over Applicant's Admitted Prior Art (Figure 15) in view of Nishino et al. (U.S. Patent 5,669,408, which is equivalent to Unexamined Japanese Patent Application No. 8-338546 cited and distinguished in the present specification at pp. 10-11). When considering patentability over the prior art, courts require that (a) the scope and content of the prior art be determined, (b) the differences between the prior art and the claims at issue be ascertained, (c) the level of ordinary skill in the pertinent art be resolved, and (d) secondary considerations be utilized as indicia of nonobviousness. Graham v. John Deere Co. of Kansas City, 148 USPQ 459, 467 (1966).

Scope and Content of the Prior Art

The Examiner has admitted that the Admitted Prior Art shown in Figure 15 of the present application does not teach that mass flow controller MFC_1 could be replaced by a pressure-type flow controller (See Prosecution History of Application No. 10/162,552, Office Action, dated August 14, 2003, page 3, lines 7-9).

The Nishino et al. Patent (U.S. Patent 5,669,408, hereafter the "Nishino'408 Patent") teaches a pressure-type flow controller. Specifically, the Nishino'408 Patent teaches that pressure-type flow controller apparatuses were known and suggests that pressure-flow type

controllers are sometimes used in place of mass flow controllers (col. 1, lines 10-25). The Nishino'408 Patent teaches an improved pressure-type flow control valve (2) in Figure 2 that controls the flow rate of a fluid maintaining an upstream side pressure P_1 of an orifice at more than about twice the downstream side pressure P_2 (see Abstract). More specifically, the Nishino'408 Patent teaches that the improved control valve (2) has the following elements:

1. an orifice forming member (5),
2. a control valve (2) on the upstream side of the orifice,
3. a pressure detector (3) provided between the control valve (2) and the orifice,
4. an operation control device (6) for calculating a flow rate Qc from the detected pressure P_1 of the pressure detector using the equation $Qc = KP_1$ where K is a constant, and
5. issuing a control signal Qy between a flow rate command signal Qs and the calculated flow rate Qc to a drive unit of the control valve (see Abstract).

The Nishino'408 Patent compares the pressure-type flow controller (2) to conventional pressure-type flow controllers as shown in Table 1, which is reproduced below.

TABLE 1

	Differential pressure type flow rate control apparatus	The invention
Measuring range of pressure detector	1:50	1:50
Precision of pressure detector	±0.25%	±0.25%
Calculated flow rate range	1:7	1:50
Flow rate measuring precision	±0.9%	±0.25%
Measuring range at maximum graduation of 100 cc/min	14–100	2–100
Size (supposing differential flow meter to be 1)	1	0.5

From Table 1 of the Nishino'408 Patent, it is shown that Nishino's pressure-flow type controller, such as is used in the present invention, has an improved calculated flow rate range and improved flow rate measuring precision over other pressure-type flow controllers.

In fact, the flow rate measuring precision is about 3 times better (i.e., ±0.25% versus ±0.9%) than other conventional pressure-flow type controllers.

The Nishino'408 Patent also compares the pressure-type flow controller (2) to a conventional mass flow controller in Table 2, which is reproduced below.

TABLE 2

		Mass flow controller	The invention
Precision	Error	±1%	±0.25%
	Error at flow rate of 2% of maximum flow rate	±50%	±12.5%
Trouble	Initial failure	Present (Yes)	None
	Clogging of valve	Present (Yes)	Possible
Cost	Manufacturing cost	1	0.75 of mass flow controller
	Running cost	High	None

From Table 2, it is evident that Nishino's pressure-flow type controller, such as is used in the embodiment recited in claim 4 of the present invention, has an improved precision over conventional mass flow controllers. In fact, the precision error is about 4 times less (i.e., ±0.25% versus ±1.0% and ±12.5% versus ±50%) than conventional mass flow controllers.

In summary, the Nishino'408 Patent teaches a pressure-type flow controller comprising an orifice forming member (5), a control valve (2), a pressure detector (3) provided between the control valve (2) and the orifice, an operation control device (6) for calculating a flow rate Qc from the detected pressure P_1 of the pressure detector using the equation $Qc = KP_1$ where K is a constant, and issuing a control signal Qy between a flow rate command signal Qs and the calculated flow rate Qc to a drive unit (14) of the control valve (2), (see Abstract). A pressure-type flow controller having these features is at best 3 times better (i.e., more precise) than a conventional pressure-type flow controller and at best 4 times better (i.e., more precise) than a conventional mass flow controller. Although Nishino's pressure-type flow controller is more precise and better than the conventional pressure-type flow controllers and conventional mass flow controllers, it is not infinitely

better. Significantly, there is no disclosure in the Nishio reference of any advantages related to the elimination of transients.

Differences Between the Prior Art and the Subject Matter of Claim 4

Figure 15 of Applicants' Admitted Prior Art teaches all of the subject matter of claim 4 except for "a plurality of pressure flow control systems for controlling of the flow rate, one controller installed on each flow passage between two of said flow control valves disposed upstream and downstream of said controller respectively, wherein each pressure flow control system comprises:

(i) an orifice formed downstream of said control system and upstream of the downstream flow control valve for discharging fluid from the flow passage;

(ii) a control valve installed upstream of said orifice and downstream of the upstream flow control valve of said control system for controlling the flow rate of the fluid;

(iii) a pressure detector disposed between said orifice and said control valve for detecting the pressure P_1 between said control valve and said orifice;

(iv) a calculation control circuit, wherein with a pressure on an upstream side of said orifice set to be twice or more higher than a pressure on a downstream side of said orifice, the instantaneous flow rate Qc is calculated as $Qc = KP_1$, where K is a constant, from the pressure P_1 on the upstream side of said orifice detected by said pressure detector, and a difference between an instantaneous flow rate Qc and a preset flow rate Qs is outputted as control signal Qy; and

(iv) a drive connecting said control valve and said calculation control circuit for receiving the control signal from the calculation control circuit and for sending the control signal to said control valve causing said control valve operating to bring the control signal Qy to zero."

The Nishino'408 Patent teaches a pressure-type flow controller having all of the claimed features of each "pressure flow control system" as recited in claim 4. Thus, the combination of references cited by the Examiner may create a *prima facie* showing of obviousness. Nonetheless, such a showing, even if made, would be easily overcome by the comparative evidence of record, and the unexpected superior properties of the invention as claimed.

The Level of Ordinary Skill in the Pertinent Art

Even assuming that a person of ordinary skill in the art would be able to substitute a pressure-type flow controller for a mass flow controller in an apparatus for supplying gases such as shown in Figure 15, that does not end the inquiry of obviousness in the present case. Specifically, there is absolutely no teaching in the prior art to show that transient surge is a problem in the parallel divided flow fluid supply apparatus of Figure 15, or that the transient surge is caused by the mass flow controller MFC_2. Specifically, it is the Applicants who examined the system for transient surge and it is the Applicants who discovered that when the mass flow controller MFC_2 is opened quickly to reach the set flow rate level, a large quantity of material gas suddenly flows into flow passage S_2, which causes the pressure P_1A to drop transiently and which causes the signal MFC_1 and MFM_1 to undergo a transient change as well (see instant specification, page 9, lines 3-7).

The courts have held that when an inventor discovers and solves a problem not recognized in the prior art, it does not necessarily negate invention when the newly discovered problem is solved by the use of old and known elements. In re Shaffer, 108 U.S.P.Q. 326, 329 (C.C.P.A. 1956).

In the present case, only the Applicants' disclosure indicates why the mass flow controllers MFC_1 and MFC_2 used in the apparatus shown in Figure 15 should be replaced

with pressure-type flow controllers FCS_1 and FCS_2, respectively, having the structural elements and operational characteristics of Nishino's pressure-type flow controllers. All the Examiner has done is take the prior art teachings discussed in Applicant's specification and concluded it would have been obvious to replace the mass flow controllers MFC_1 and MFC_2 used in the apparatus shown in Figure 15 with the pressure-type flow controllers FCS_1 and FCS_2, respectively, to arrive at the subject matter of claim 4. This conjecture is merely impermissible hindsight reconstruction of the claimed invention using the applicant's own disclosure. In re Fritsch, 23 U.S.P.Q.2d 1780 (Fed. Cir. 1992).

Even if Applicants were to concede that the Examiner has established a prima facie case of obviousness against the subject matter of claim 4, the analysis of patentability in accordance with the Graham factors does not end here. Specifically, the secondary considerations must be weighed. Graham, 148 USPQ at 467.

Secondary Considerations Supporting Patentability of Claim 4

The Federal Circuit has established, as a matter of law, that secondary considerations are essential components of the obviousness determination and that unexpected results created by the claimed invention, or unexpected properties of the claimed invention, may overcome a prima facie case of obviousness. In re Rouffet, 47 U.S.P.Q.2d 1453, 1456 (Fed. Cir. 1998). However, defining what is an unexpected result created by the claimed invention, or an unexpected property of the claimed invention, legally sufficient to overcome a prima facie case of obviousness has not been left to chance or whim. The Federal Circuit has specifically ruled that (1) when an applicant demonstrates substantially improved results, (2) and states that the results were unexpected, then (3) this suffices to establish unexpected results in the absence of evidence to the contrary. In re Soni, 34 U.S.P.Q.2d 1684, 1688 (Fed. Cir. 1995).

First Prong of Soni Test

In the present case, Applicants discuss the three prong Soni test as follows. With respect to the first prong of the test, Figure 16 of the instant application demonstrates transient surge effects in the various portions (i.e., P_1A, P_1B, MFM_1, MFC_1, MFC_2, and MFM_2) of the prior art apparatus shown in Figure 15 when a mass flow controller MFC_2 is used to open one closed flow passage while the other flow passage is open. The apparatus shown in Figure 15 is the closest prior art to the presently claimed invention of claim 4. Applicants are only required to compare the claimed invention to the closest prior art in order to overcome an obviousness determination. In re Burkel, 201 U.S.P.Q. 67, 71 (C.C.P.A. 1979).

In comparison, Figure 9, corresponding to the embodiment of the present invention shown in Figure 7 and claimed in claim 4, **eliminates any transient surge effect** when opening one closed flow passage while the other flow passage is open. Specifically, Applicant's Figure 9 shows no appreciable surge perturbation in the signals in P_1A, P_1B, MFM_1, and FCS_1 when the system goes from the closed to the open state. In addition, the signals are relatively square in FCS_2 and MFM_2. This is a **substantial** improvement over the signal perturbation seen in P_1A, P_1B, MFM_1, and MFC_1, both in quality and quantity. Moreover it is an improvement of kind, not merely one of degree.

Those skilled in the art would recognize that the improvement of the apparatus claimed in claim 4 over the prior art is **infinite** and demonstrates both an unexpected result and an unexpected property. Specifically, for example, the amount of transient surge perturbation in MFM_1 in the apparatus in accordance with claim 4 of the present invention is essentially zero (See Figure 9). On the other hand, the amount of perturbation in MFM_1 in the prior art apparatus is definitely measurable (See Figure 16), and let's call its absolute

value "A." The ratio of A/0 is ∞ This **infinite improvement** is an undisputable unexpected and superior result.

Consider the teachings of the Nishino'408 Patent. As discussed above, Nishino's pressure-type flow controller is 4 times more precise than a conventional mass flow controller. Therefore, one skilled in the art might reasonably conclude that an improvement in flow control could be expected when substituting Nishino's pressure-type flow controller for the mass flow controller of the prior art apparatus of Figure 15. However, as the Nishino flow controller is only 4 times more precise than the mass flow controller, one skilled in the art could only expect a four-fold increase in precision as a result of improved flow measurement. There is nothing to suggest that the surge problem would be improved or even affected. Certainly, one skilled in the art could not predict, based upon the data provided in Table 2 of the Nishino'408 Patent, that the substitution of Nishino's pressure-type flow controller would result in the complete elimination of transient surge effects in the entire system. One of ordinary skill in the art could not expect the infinite improvement provided by the claimed invention.

In addition, the apparatus claimed in claim 4 has the unexpected property of being free of transient surge effect. As shown in Figure 16, the signals in MFC_2 and MFM_2 of the prior art apparatus demonstrate massive amounts of perturbation and are not approximately square. On the other hand, as shown in Figure 9, the signals in FCS_2 and MFM_2 of the apparatus recited in claim 4 are approximately square and demonstrate no transient surge effect.

Second Prong of Soni Test

With respect to the second prong of the Soni test, Applicants have stated and shown that the pressure and flow rate stability (i.e., steady state flow) achieved by the present

invention was **unexpected** (See Prosecution History of Application No. 10/162,552), Amendment (B), filed May 5, 2003, page 13, lines 4-7). The result created by the invention recited in claim 4, wherein the apparatus is substantially free from transient surge effects as discussed above, was entirely **unexpected**. As discussed below, there is absolutely no evidence of record to the contrary.

Third Prong of Soni Test

The Examiner has provided **no evidence** contrary to Applicants findings of substantially improved and unexpected results created by the invention recited in claim 4. Consequently, as Applicants have satisfied the first and second prongs of the Soni test and there is no evidence to the contrary, Applicants' evidence of unexpected results has successfully overcome the Examiner's obviousness rejection as a matter of law.

Examiner's Counterarguments regarding Unexpected Results

The Examiner raises the following counterarguments (See Prosecution History of Application No. 10/162,552, Office Action, dated August 14, 2003, page 4, line 18, to page 5, line 4) with respect to Applicants' evidence of superior and unexpected results (See Prosecution History of Application No. 10/162,552, Amendment (B), filed May 5, 2003, page 11, line 19, to page 13, line 11). First, the Examiner argues that the claims are not commensurate in scope with the invention because the "limitation concerning transient change in pressure is not recited in claim 4." Second, the Examiner argues that "it is not understood how and/why structurally equivalent device of the combination as set forth [in claim 4] will not generate the alleged unexpected result (emphasis added)."

Claim 4 is Commensurate in Scope with Figure 9

The Examiner's first objection is untenable as a matter of law. The courts have ruled **there is no legal requirement that the unexpected results relied upon for patentability be recited in the claims.** In re Merchant, 197 U.S.P.Q. 785, 788 (C.C.P.A. 1966). On the other hand, **it is legally sufficient that the features responsible for creating the unexpected results be recited in the claim.** Id.

In the case of claim 4, the novel and unobvious combination of old elements that creates the unexpected result includes (a) a pressure regulator having an upstream side and a downstream side; (b) a plurality of parallel flow passages disposed downstream of said pressure regulator, wherein a single flow of fluid from said pressure regulator is branched into said parallel flow passages; (c) a plurality of flow control valves disposed in said flow passages; and (d) a plurality of pressure flow control systems for controlling of the flow rate, one controller installed on each flow passage between two of said flow control valves disposed upstream and downstream of said controller respectively. However, each pressure flow control system, as recited in claim 4, must include the following elements: (i) an orifice formed downstream of said control system and upstream of the downstream flow control valve for discharging fluid from the flow passage; (ii) a control valve installed upstream of said orifice and downstream of the upstream flow control valve of said control system for controlling the flow rate of the fluid; (iii) a pressure detector disposed between said orifice and said control valve for detecting the pressure P_1 between said control valve and said orifice; (iv) a calculation control circuit, wherein with a pressure on an upstream side of said orifice set to be twice or more higher than a pressure on a downstream side of said orifice, the instantaneous flow rate Qc is calculated as $Qc = KP_1$, where K is a constant, from the pressure P_1 on the upstream side of said orifice detected by said pressure detector, and a difference between an instantaneous flow rate Qc and a preset flow rate Qs is outputted as

control signal Qy; and (v) a drive connecting said control valve and said calculation control circuit for receiving the control signal from the calculation control circuit and for sending the control signal to said control valve causing said control valve operating to bring the control signal Qy to zero.

The unexpected results shown in Figure 9 are created by the new combination of old elements recited in claim 4. Therefore, Applicants have met the legal requirements established in Merchant, 197 U.S.P.Q. at 788, by claiming the structure that produces the unexpected results. Necessarily, it follows that the unexpected results are commensurate in scope with the subject matter of claim 4.

In the Advisory Action, dated November 25, 2003, regarding the prosecution of Application No. 10/162,552, the Examiner stated that "the evidence pertains to interaction between at least two active flow lines in a plurality of flow lines and such an interaction is not recited in claim 4." New claims 9, 13 and 17 have been added to recite such an interaction between at least two active flow lines.

Comparison Made with the Closest Prior Art

The Examiner's second objection is also untenable as a matter of law. Specifically, Applicants are only required to compare the claimed invention to the closest prior art. Burkel, 201 U.S.P.Q. at 71. It is generally understood that Applicant is not required to compare the invention with subject matter that does not already exist in the prior art—such as the combination of prior art that the examiner proposes. In re Geiger, 2 U.S.P.Q.2d 1276, 1279 (1987) (Newman, J., concurring). In addition, the courts have rejected the notion that Applicant should be required to compare "the results of the invention with the results of the invention." In re Chapman, 148 U.S.P.Q. 711, 714 (C.C.P.A. 1966). In other words, the applicant is not required to compare his invention with a combination of prior art elements

proposed in a rejection. The Examiner is bound by these rules, and they are thoroughly discussed in the MPEP §§ 716.02 (d) and (e).

In the present case, the Examiner argues that Applicants must compare the invention claimed in claim 4 with a "structurally equivalent device of the combination." In other words, it appears the Examiner is arguing that Applicants must compare the invention claimed in claim 4 with either (a) a device that does not already exist in the prior art, or (b) with the combination of elements as shown in Figure 7, which is a "structurally equivalent device of the combination." The Examiner's position appears to be that the Applicants must compare the invention to the theoretical construct that could be created from the combination of teachings from Applicant's Admitted Prior Art (Figure 15) and the Nishino'408 Patent. However, this is not the law and it amounts to requiring comparing the invention to the invention, which is not permitted. The Examiner's position is simply wrong as a matter of law.

As a matter of law, the Examiner cannot require the Applicants to compare the invention to anything other than the closest prior art. In the present case, the apparatus shown in Figure 15 is the closest prior art, and the applicant's have compared their invention to this prior art.

The combination of elements recited in claim 4 produces the unexpected results shown in Figure 9. The only "structurally equivalent device of the combination" that the Applicants are aware of is the apparatus of Figure 7, which is an illustrative embodiment of the invention of claim 4. The Examiner appears to be arguing that Applicants must compare the "structurally equivalent device of the combination," such as shown in Figure 7, with the subject matter claimed in claim 4. Such a comparison would be comparing "the results of the invention with the results of the invention," which the applicant is not required to do. Chapman, 148 U.S.P.Q. at 714.

Conclusion

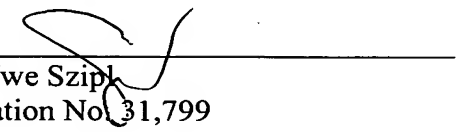
Even assuming that the Examiner has established a prima facie case of obviousness against claim 4 over Figure 15 of Applicants' Admitted Prior Art in view of the Nishino'408 Patent, such a showing would be rebutted by the evidence of record. Applicants' specification includes evidence of substantially improved and unexpected results over the closest prior art. Applicants have shown that the comparative data included in the present specification satisfies the patentability prongs of the Soni test, and the Examiner has produced **no evidence** to the contrary. Therefore, as a matter of law, claim 4 should be allowed because the weight of Applicant's comparative data in the specification is legally sufficient to overcome Examiner's prima facie case of obviousness.

For all of the above reasons, claims 4 and 9-17 are in condition for allowance and a prompt notice of allowance is earnestly solicited.

Questions are welcomed by the below-signed attorney for Applicants.

Respectfully submitted,

GRIFFIN & SZIPL, P.C.



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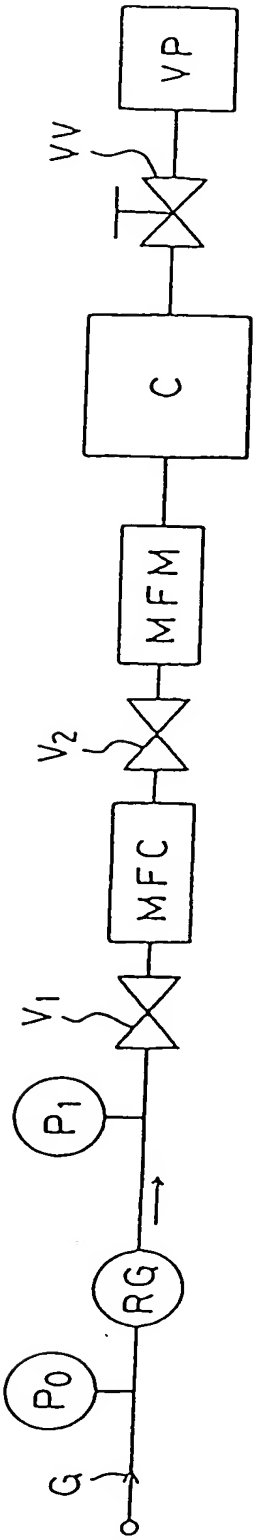


FIG. 14

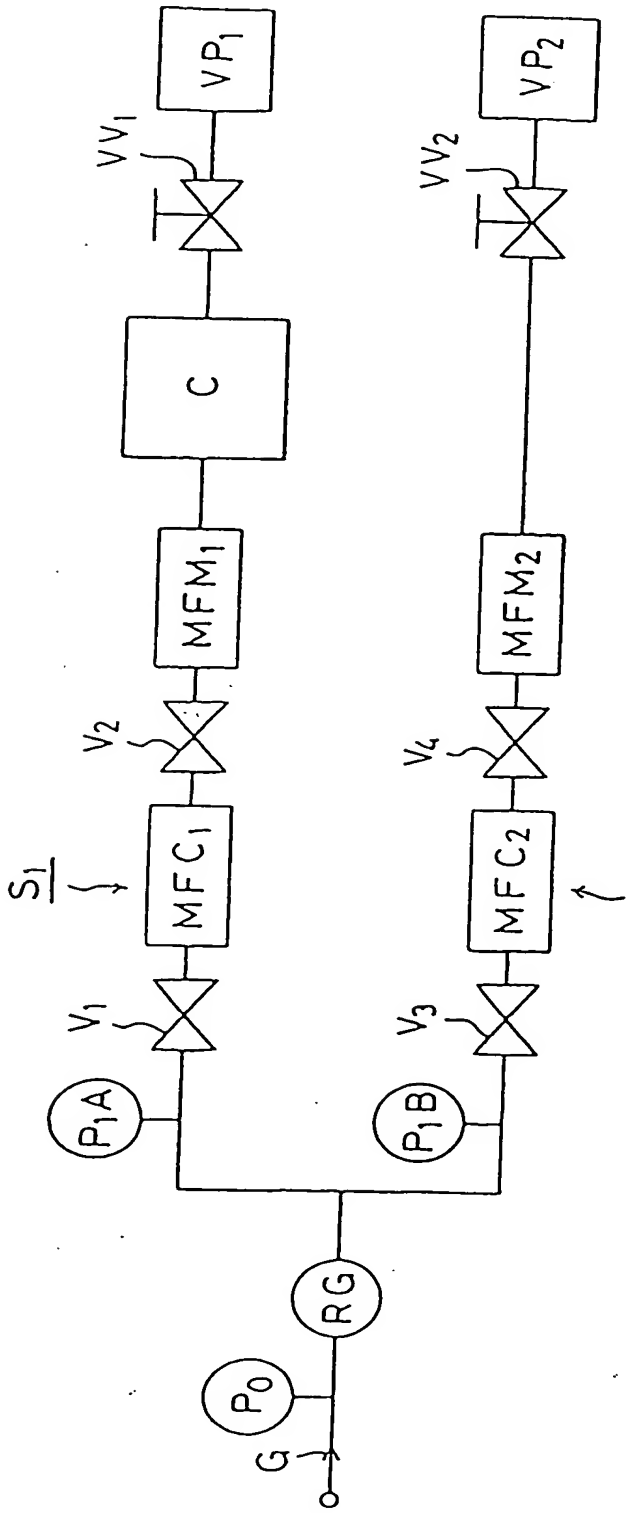
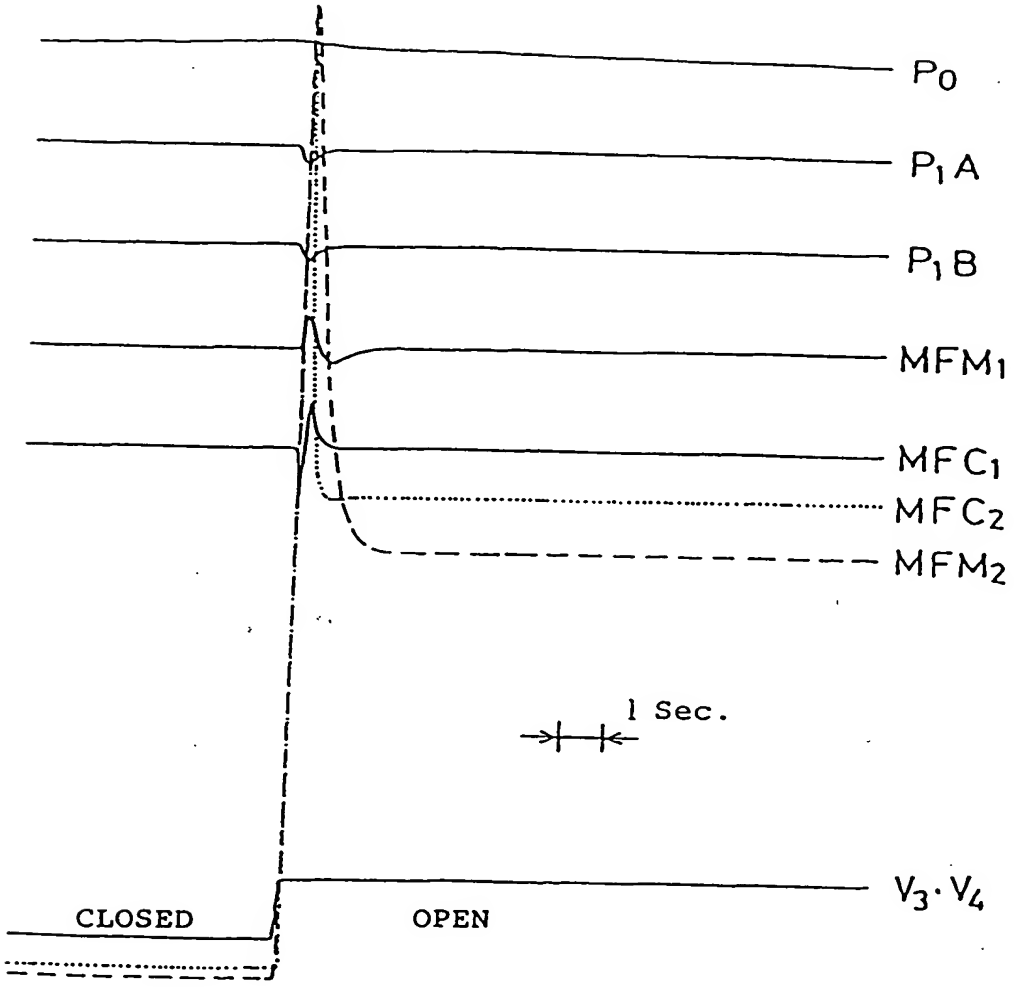


FIG. 15 Prior Art

Prior Art

FIG. 16 Prior Art



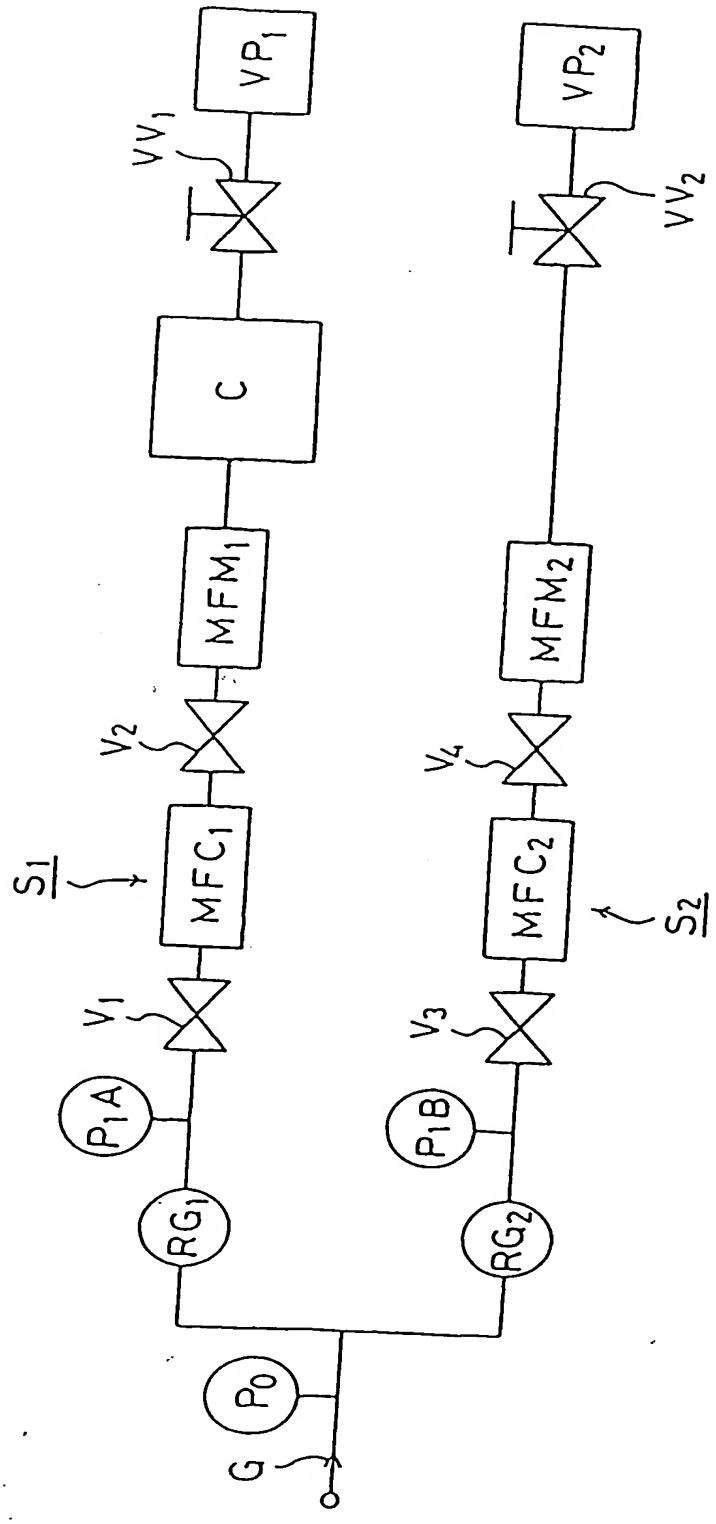
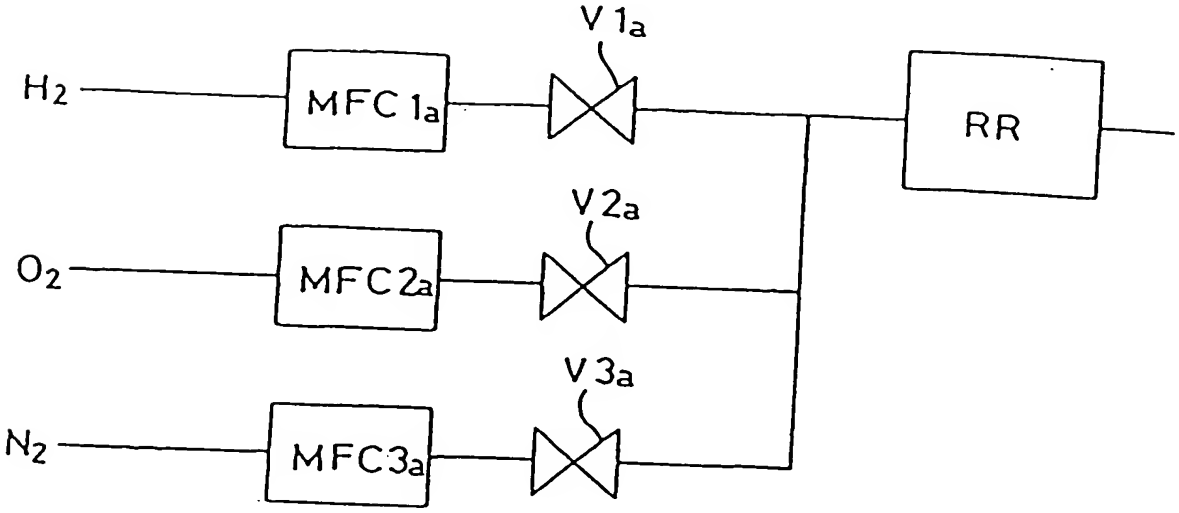


FIG. 17 Prior Art

FIG. 18 Prior Art



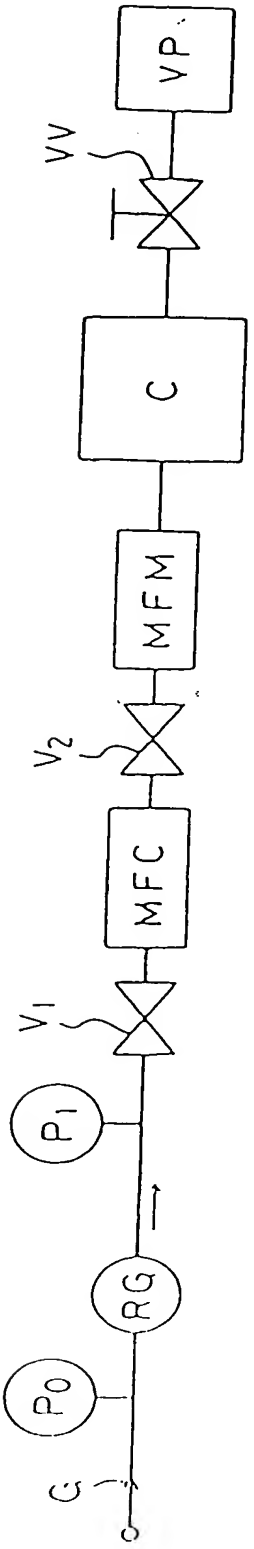


FIG. 14
(PRIOR ART)

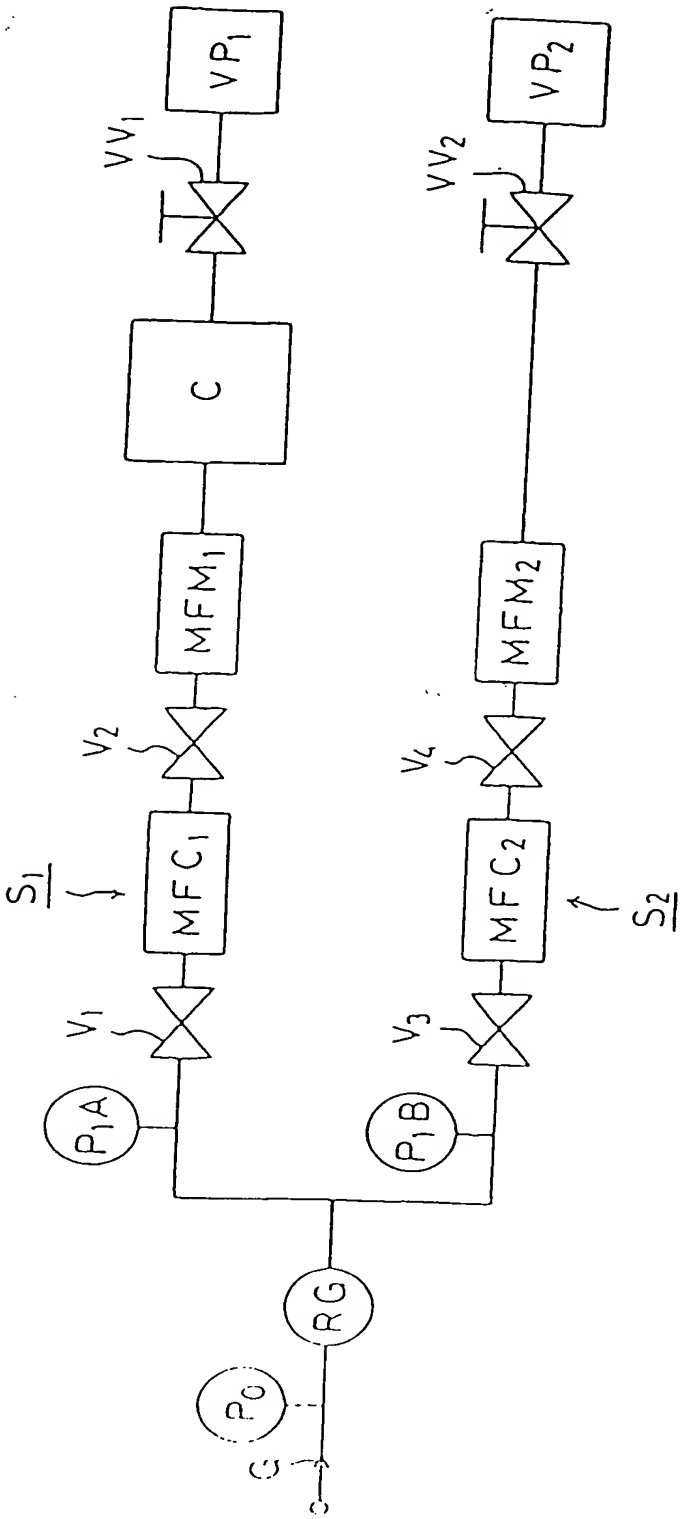
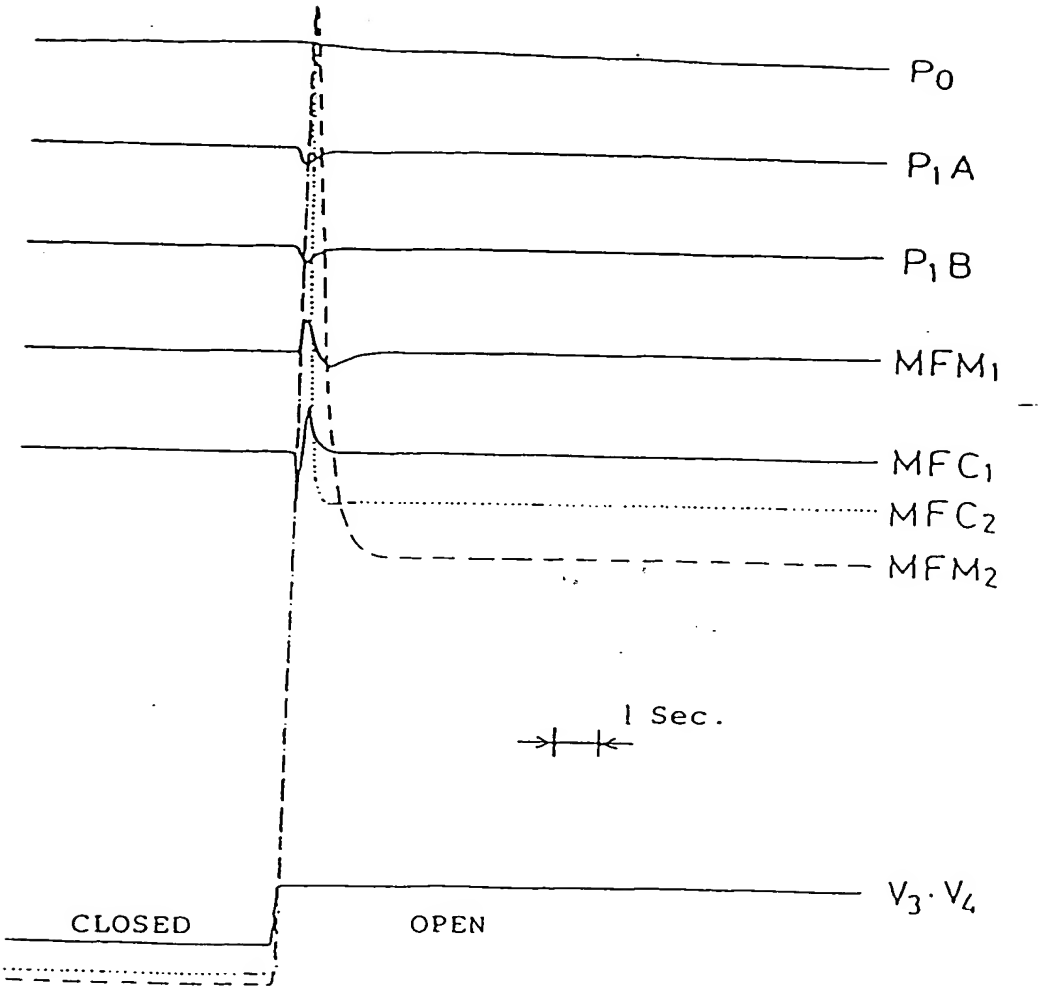


FIG. 15
(PRIOR ART)

FIG. 16.
(PRIOR ART)



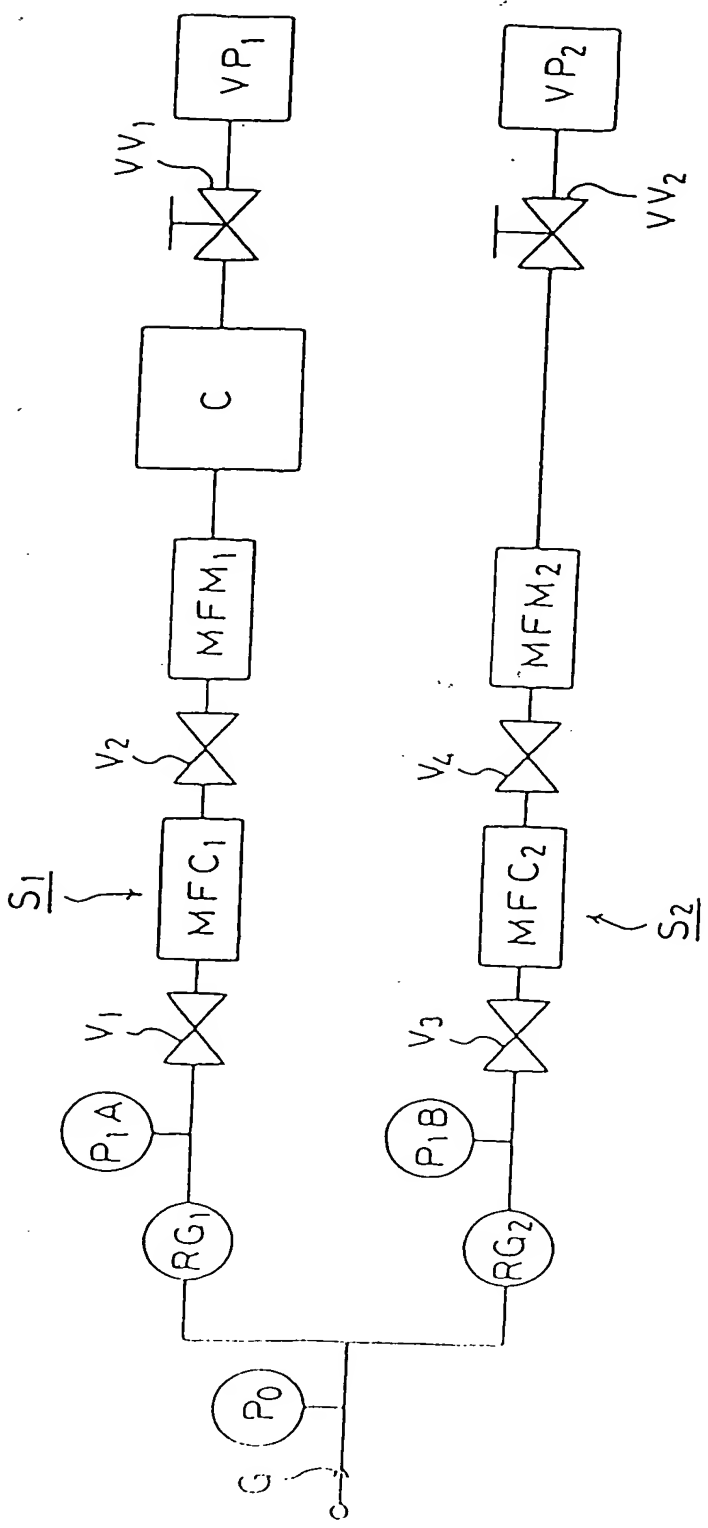


FIG. 17.
(PRIOR ART)

FIG. 18
(PRIOR ART)